

by either species, and no doubt fledglings perish in numbers by these ever-watchful enemies.

F. FINN.

Indian Museum, Calcutta, October 19.

MR. FINN's letter is interesting as giving support to the opinion that it is when at rest that butterflies are chiefly attacked by birds. The injuries to be noticed on the wings of the insects very frequently are symmetrical on the right and left sides, and can only have been inflicted when the wings were folded in repose. I can only recall one occasion on which I have witnessed a bird attack a butterfly in flight, and then the attempt was unsuccessful.

OSWALD H. LATTER.

Charterhouse, Godalming, November 7.

THE EFFECT OF WEATHER ON EVERY-DAY LIFE.¹

SOME time since, a distinguished member of the Cotton Exchange asked my assistance to solve a problem connected with the variation of prices in "futures." He remarked that these prices varied almost from hour to hour without any apparent cause, such as a knowledge of the state of the crop or of the condition of the American market, which would explain these fluctuations. He was tempted to look for a subjective cause, and thought it might be found in the state of the weather exercising a powerful but unrecognised influence on the dispositions of purchasers and speculators, inducing them to buy or sell as they were alternately swayed by hopefulness or despondency. I was therefore invited to compare the movement of the cotton market with the variations in the weather, with the view of detecting the hidden relation, and was further stimulated to exertion by the assurance that if the origin of the fluctuation could be discovered "wealth beyond the dreams of avarice" would be at my command. Unhappily I failed to trace in the fickle weather the hidden springs that underlie the motives of speculators; and that fortune is still to be made by some one, possessed it may be of greater ingenuity or greater application, and to such an one I present the idea without hope of reward or acknowledgment.

Mr. Dexter's book reminded me of this experience, for he, too, has apparently embarked on an inquiry as difficult, but with a motive more noble, and let us hope with a reward more certain. Mr. Dexter wishes to trace the influence of weather on human conduct in general, and to see how far man's emotional state is affected by meteorological conditions. His reward is the attainment of a degree of Doctor of Philosophy, and the inquiry which he has instituted has apparently been undertaken with a view to meet the requirements of the authorities of Columbia University. One may sincerely hope that Mr. Dexter will have his ambition gratified, for to say that he has not spared himself in the labour of the inquiry is to say little. What is much more to the purpose he has not spared others. Teachers and superintendents of schools, wardens of prisons, superintendents of asylums for the insane, officials of the Weather Bureau and many others have been laid under contribution, by having submitted to them a "questionnaire" to completely satisfy whose interrogations involved not a little labour. Apart from the inconvenience which such a process might cause individuals, we doubt whether the plan adopted is the most trustworthy that could be found. Personal influence rather than climatic conditions is likely to introduce a systematic error into the final result. It is open to question whether the authorities consulted have satisfactorily eliminated the effect of weather from their own

systems and mental states. The power of punishment rests with the authorities who have been consulted, and it may happen that those under their care are the victims of an irritability, engendered in the supervisors from causes with which the weather has absolutely no concern. To judge therefore mainly by the infliction of punishments seems of rather doubtful wisdom. This obvious objection has, of course, not escaped the author, and in one place he certainly recognises that the emotional state of the teacher is a not unimportant factor in the result. Indeed, he says, it may be the teacher we are studying more largely even than the pupil. The frankness with which this admission is made is more to be approved than is the reasoning by which it is set aside.

And now we are tempted to record a fact of which Mr. Dexter is entitled to make the fullest use. The temperature is 78°, the sky is cloudy, the wind is east, the velocity about three miles an hour, and under these conditions we find it much easier to present the facts at which Mr. Dexter has arrived than to criticise his results or carp at his methods. We notice that the author has studied, grouped, and commented on no less than fourteen classes of empirical data, embracing more than a quarter of a million separate facts. These fortunately can be grouped under fewer heads than the elaborate method pursued by the author admitted, and we hope we shall do him no injustice by the curtailment. First we have the registration and the behaviour of children in public schools (which we should probably call Board Schools in England) in New York City and at Denver, Colorado, two very widely different climates it will be remarked. Then we have a large amount of information drawn from police reports, which include assault and battery, discipline in penitentiaries, arrests for insanity and reported suicides. To these are added a few more or less fancy matters, in which the numbers involved are necessarily small, such as the clerical errors discovered in the records of certain of the national banks in New York City, maximum strength tests in gymnasia, and lastly "a study in discrimination carried on in the Psychological Laboratory of Columbia University." The discussion, it will be seen, is very wide, and one fact that will strike the reader prominently when he considers the variety of occupations into which the author has thought it judicious to push his investigations is the length to which this kind of inquiry can be carried when once we are bound hand and foot by the demon of statistics. Possibly the weather has no more to do with a clerk's mistakes than has the quantity or the quality of his supper the night before, but given a nicely ruled sheet of paper, and a system of rectangular coordinates, it is impossible to forgo the delight of plotting results to a scale. This is a harmless amusement; but when we begin to draw conclusions and to build theories, we may go as hopelessly astray as did the famous witness who connected the high tides with the building of a steeple. The author endeavours to meet any criticism of this nature in a passage which we may quote at length, to serve both as an example of his style of writing and his method of argument.

"The meteorological conditions are the essential causes of certain general physiological or mental states, some of which seem to be fertile fields for the action of immediate causes which are, from the standpoint of this problem, accidental. To be concrete, on a certain morning Johnny could not have what he wanted for breakfast, and went to school with the sulks, with a consequent disastrous effect upon his deportment. Most certainly the disappointment at home had a causal relation to his demerit, and no excuse from the weather is sought. But if we take the record of 200 Johnnies for 600 different days, and find that on certain days more of them are out of sorts than on other days, we look for a constant con-

¹ "Conduct and the Weather: an inductive study of the mental effects of definite meteorological conditions." By Edwin Grant Dexter, A.M. (New York and London: The Macmillan Co. *Psychological Review* Memoir.)

dition which might be considered in some way the cause. We cannot suppose that bad breakfasts or whippings or the disappointments common to child life would bear this constant relation, so look for it elsewhere. Wherever found it must be considered valid. But it must be some factor which would be a part of the environment of all the children similarly affected. We have sought it in the varying conditions of weather, with what success is shown by the curves which form the basis of our discussion."

These curves or diagrams are not so conclusive as the author seems to think. We have no proof that a legitimate application of the calculus of probabilities has been attempted. We cannot estimate the amount of variation exhibited by particular instances from the general interpolatory curve. In a word we cannot understand how the numerous observations have been combined, so that the unavoidable irregular errors have the least possible effect on the result. Further, these diagrams, or at least some of them, present another difficulty. To take the first figure which exhibits the effect of weather on the deportment, the class and mechanical work of boys and of girls in schools of various towns, and of boys and girls combined, in Colorado. The abscissa line is divided into eight sections of equal length defined by the weather conditions—hot, cold, wind, calm, storm, muggy, cloud and clear. Evidently there is no connection between the several parts—no regular progression in such an abscissa line. We cannot see, therefore, any reason for joining the several points, of which five out of eight are practically zero. But taking the author's interpretation as it stands, which for reasons already given we are quite prepared to do, this is what we learn.

In climates similar to those of New York, deportment and work are considered to be at their best on cold, calm, clear days, irrespective of sex, and at their worst on "muggy" days. In Colorado, calmness of the atmosphere produces a desirable effect on the condition of the pupils, wind exercises the most deplorable influence. Deportment, which apparently plays a great part in these schools, a fact which should rejoice the shade of the late Mr. Turveydrop, is affected by weather conditions, more in the case of boys than girls. This fact is explained by one teacher on the ground that boys are under less disciplinary control than girls. Another adds that girls "are greater adepts, not only at restraining impulses to do mischief, but also in concealing all evidences of it when it is in progress. This may be due to a greater horror on their part of an open reprimand." The cogency of this argument is not manifest, because the consequences of detection are likely to be visited on the boys with greater asperity than is covered by the term "open reprimand." The knowledge that acute punishment can and will follow conviction, should act as a deterrent and suggest methods of concealment that defy the penetration of the teacher.

When we come to discuss the behaviour of children of older growth, we still find the weather capable of exercising a baneful influence on their conduct and self-control, as illustrated by the number of suicides, assaults, and the perpetration of grave crimes. With regard to the morbid tendency disclosed in the mental state that produces the first of these misdemeanours, the author confirms the remark of Morselli and of others, who have considered the statistics of suicide, that an undue proportion take place in May and the spring and summer months of the year. This fact, which is contrary to the commonly received opinion, Mr. Dexter explains as arising not merely from a depleted vitality, produced by the exhausting influence of the cold of winter, but also by the "conscious or unconscious contrast of the recognised low condition of vitality with the exuberance of energy and life in the rejuvenated nature about, making

one that is weak feel that the struggle against the resistance to life and progress, in competition with a world so virile, is hopeless." This remark is perhaps more ingenious than convincing, but if any considerable space of time is supposed to elapse between the contemplation and the completion of the act, it seems useless to tabulate the number of suicides with the height of the barometer and the humidity of the atmosphere, quantities that are continually varying.

It is of interest to notice that the number of assaults increases pretty uniformly with the temperature, or it would be more correct to say with an excess of temperature. Given a hot day in the spring or autumn, and our pugnacity rises in an alarming manner, though in the hot days of summer this quarrelsome mood is not so aggressive. The author concludes from the arrangement of his facts that the effects of heat up to a certain limit are vitalising in their tendency, while at the same time irritating; but above that limit, heat is so devitalising in its effects as to leave hardly energy enough to carry on a fight. Sad to relate, the effect of heat upon ladies is greater than on men; and this is shown not only by an increased desire to fight, but also by evident mental unbalancing. Whether one is the consequence of the other, or whether both are to be traced to the greater sensitiveness of women to weather conditions, is too thorny a subject for masculine debate. But the tales that come from penitentiaries and from those who have charge of the insane, alike testify to the irritating effects of increased temperature. In this connection the author thinks that a study of the record of profanity might yield interesting results, but unfortunately he adds "inclination alone will at least get no one into the police court," so that numerical data are wanting to discuss this phase of the weakness of human nature. It would probably be found that the curve would not greatly differ from that of assault, and it would certainly be comforting if we could shift the responsibility of our deviations from rectitude to such an impersonal agent as the weather. In our own ignorance we were rather tempted to attribute these lapses from good conduct to too free an indulgence in alcoholic beverages in the warm weather, but the author with far greater familiarity with the subject traces them to a much deeper source to be found possibly "in the depletion of the cell structure," or "in acceleration of the oxidising processes of life," expressions which we can only hope are as accurate as they are sonorous.

It is no new question to seek the effect of weather upon the moods and impulses of the population, but Mr. Dexter has tapped a new source of inquiry when he asks what are the meteorological conditions which induce clerks in banks, and we presume computers in general, to make mistakes in their work, and to offer up incorrect answers. When the barometer is low, let us forswear computations, but if the humidity be at the same time small, it would be positively immoral to attempt to add up a column of figures. The author explains this by the fact "that the intellectual balance is more disturbed by the increased electrical potential than is the emotional." We are afraid to discuss this proposition, more especially as we have overstepped the limits of space, but we must find room to say that we respect the evident trouble and care which the author has taken in compiling his results, and to ask his pardon if our remarks have appeared too flippant, when applied to a work which he has taken very seriously. Some of his inquiries are not yet complete, but we hope that he will continue them to the end, and leave his results in such a form that a more rigorous discussion may be possible. By "rigorous" is merely meant on recognised mathematical principles, in which one can see easily the relative "weight" which is to be attached to the separate deductions, and the "probable error" that accompanies each.

W. E. P.